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WASHINGTON LETTER.

WASHINGTON, D. C., DECEMBER 15, 1898.

WATERWAYS.—The abandonment of the Pennsylvania canals leading from the coal region, the rumored sale of the Chesapeake and Ohio Canal, and the giving up of the waterway across the Delaware-Maryland Peninsula, are coincident with the active discussion of the feasibility of deep waterways from the Lakes to the sea, and of the great interoceanic lines at Nicaragua and Panama. On one hand is the general recognition of the present unprofitable character of those arteries of commerce which a half century ago were the foundation of commercial success, and on the other the appreciation of the vital importance of waterways capable of floating the modern large merchant vessels. The tendency to wholesaling and to concentration is thus exhibited in the fact that small canal boats and small canals do not pay, while large waterways are desirable at almost any cost.

The report of the Nicaragua Canal Commission of the Department of State has not yet been presented to Congress, but enough is apparently known to the friends of the canal to justify their activity in pressing forward the superiority of this project over that at Panama. There appears to be no question but that a canal must be built at an early date. In the same manner the advocates of the improvement of internal commerce are urging the extension of the system of movable dams on the Ohio River to provide slack water navigation in times of drought. It has been pointed out that the commerce on this river already far exceeds in tonnage that of the main Mississippi and its other tributaries. The supporters of the project of a ship canal between the Ohio River and the Great Lakes have been somewhat set back but not wholly discouraged by the recent speech of Mr. Andrew Carnegie before the Pittsburg Chamber of Commerce, in which he points out that he was among the first to suggest that a deeper canal should lead from the waters of Lake Erie to the Ohio. Since then conditions have changed and his present opinion is that if we had a ship canal 15 feet in depth the lake steamers would not come to Pittsburg. He stated that he did not wish to appear even by silence to be considered a party to any attempt to entice private capital to invest in building a canal between Pittsburg and the Lakes, because he is convinced that this capital would be entirely lost.

On the more northern project of deep waterways through New York the engineers are continuing surveys, but have not as yet made their report. They are obtaining a valuable body of geographic information, particularly concerning the volume of the rivers and the height and character of the divides between prominent drainage basins.

NAVIGABILITY OF THE RIO GRANDE.—The importance of exact geographic knowledge is well illustrated by the case now pending before the Supreme Court involving the question of navigability of the Rio Grande, particularly in that part of the river north of El Paso. Although the location of this stream is so well known on account of its forming the greater part of the boundary line between the United States and the Republic of Mexico, yet it is curious to note the erroneous conceptions popularly held concerning this stream. The scholar in the public school of the East who has seen a river like the Connecticut, Hudson, Delaware, or Susquehanna, probably pictures the Rio Grande as having a volume as large or larger than these, especially when on the map of the United States he sees its great extent from the mountains of central Colorado down through New Mexico along Texas to the Gulf. He is surprised and incredulous when told that at points above the middle of this course the waters have diminished to such an extent that the bed becomes nearly or quite dry, and that for months at a time the thirsty travellers may drive along or across the channel of this great stream hunting for water, not knowing even that they have passed beyond the river.

These facts are not often given in school geographies or even in more pretentious works, and the efforts of advocates to prove or disprove the navigability of the stream have demonstrated at least how little has been recorded concerning this great drainage system.

As a safe and permanent boundary between the two nations, the Rio Grande cannot be considered a success. Its bed—dry for miles through many months of the year—may be filled by the impetuous torrent which, checked by the mud and *débris* carried on its flood wave, cuts new channels, leaving many square miles of Mexican territory on the north of the deepest channel, or cutting off the communication of Texas ranchers from their native State. The torrents subsiding, the water gradually disappears, leaving wreckage along its course and a train of interminable controversies as to whether this piece of land or that is in Texas or in Mexico.

Navigation on a part at least of the Rio Grande is confined dur-

ing much of the year to "prairie schooners" * or similar vehicles. The Supreme Court of New Mexico announced that it is perfectly clear that the Rio Grande above El Paso has never been used as a navigable stream and that it is not now capable of being so used, more especially since dams have been erected and maintained at El Paso for nearly two hundred years, by which water has been taken out for irrigation on both sides of the stream. Nevertheless, this question of navigability, with other technical points, has been a matter of legal argument.

There is one point which perhaps appeals more to geographers than to the legal mind, and that is, that the main stream of the Rio Grande has been ignored in applying the name, as in the case of the Mississippi. With the latter it is often held that the name Mississippi should be applied to the Missouri and not to the part of the river from above St. Louis to St. Paul. With the Rio Grande the conditions are reversed; the main stream, if we consider volume of flow and geographic course, is really the Pecos, while that part above the mouth of the Pecos is to a certain extent an intermittent tributary, whose flow has only an occasional influence upon the trunk stream. This fact has been pointed out by Mr. R. T. Hill, who classes the upper Rio Grande with the innumerable lost rivers of the interior which, rising in the mountains, gradually lose their waters in the lower deserts. The Rio Grande belongs to this type, with the exception that it has cut through several desert ranges and at flood times contributes its waters to those flowing from the Pecos.

FLUCTUATIONS OF THE MISSISSIPPI.—The floods and low water of the Mississippi River are the resultant of forces distributed over the vast area of one and a quarter million square miles. The main stream may be regarded as a delicate instrument which in its pulsations responds to impulses given hundreds of miles away. The play of these forces has been beautifully described in a recent paper by Mr. James L. Greenleaf. He dwells upon the silent forces in the sunshine, air and water, which are continually at work with bewildering complexity, as shown by the rising and falling stream whose sensitive surface is the infallible recorder of them all. Taking a large view of the subject, he shows that throughout the year there are two waves of intensity which sweep across the great basin of the Mississippi from south to north. In the autumn all of the rivers have a tendency to reach the lowest point, and all begin to

* A popular name for the waggon used on the great plains.

rise toward the latter part of the winter. The increased flow is first shown in the southern rivers in January, and creeping northward the accumulation of waters is shown by the higher stages of the Ohio in late January and the Missouri and upper Mississippi in February, resulting often in the disastrous floods of this latter month. This early flood is due to the gradual increase of temperature, broadening from the Gulf toward the upper headwaters. The great bulk of the water comes from the southern half of the watershed, while yet the northern streams are locked in ice.

The high water thus produced by this temperature wave is often prolonged until the time when the rivers are again caused to rise by a similar wave of effective rainfall, which also seems to sweep across the country. Starting from the Gulf in late winter it travels slowly northward, climbing the plains to the western mountains. It has followed and lagged behind the earlier wave of melting, sometimes overtaking it, with disastrous effects to the low lands.

The subject of the floods of the Mississippi is now under investigation by a special committee of the Senate, and is exhaustively treated in volumes of evidence from citizens and experts in various lines. The point of greatest geographic interest probably is that the disastrous floods from the lower river occur at times when the headwaters in the Rocky Mountain region have not yet felt the influence of the advancing wave of temperature. These upper streams do not begin to swell until the high floods of the lower river have passed away, and their influence in prolonging the boating stage is therefore rather for good than for evil.

BASINS OF THE PLAINS.—The High Plains of the West, lying well within the semi-arid region, are popularly known to have an almost perfectly level surface. Careful examination of this surface shows it to be covered with shallow basins, varying from those two to three feet in depth and with breadth twenty times as great up to those with a depth of nearly one hundred feet and a breadth of one or two miles. This remarkable condition has been described by Mr. Willard D. Johnson in a report as yet unpublished, and the origin of the remarkable features is discussed at length. He points out that the forces at work are probably those present elsewhere, but that their effects are masked or concealed by the erosion of more humid regions. These depressions, or basins, may be caused by unequal subsidence of the stream-built sands and gravels which form the plains, such as might occur through a slight rearrangement of the particles by percolating water, or they may be

due to actual removal by solution of particles, causing channels which when enlarged are broken by the weight of the overlying earth. Where the depressions are in the form of pits or funnels, there is little doubt but that sudden subsidence into caverns has taken place, but on the other hand Mr. Johnson has become satisfied that most of the depressions are of gradual growth, and that even in the majority of cases the so-called "buffalo wallows" are in their initial stage shallow saucer-like depressions, originating from gradual solution or removal of material lying within a few feet under the surface. Buffalo doubtless wallowed in such hollows, as water would necessarily collect there after subsidence had begun.

The most remarkable case of subsidence is that of a sink-hole which originated suddenly in March, 1879, near the town of Meade, in southwestern Kansas. There had been an old road directly across the site, and over this a waggon had passed on March 3. Returning 23 days later a deep, sharp-edged pit was encountered about 175 feet across. It is now oval in form, 215 feet in greatest diameter. Cracks of roughly concentric form surround the pit, the dimensions of the area thus affected being 525 by 375 feet. The depth in 1879 was stated to be 89 feet, but through the slipping in of the banks the depth has decreased to 54 feet. When first noted the water was 75 feet in depth, being higher than the adjacent water level. This is probably due to the fact that the roof fell into a cavern full of salt water, displacing this, and that later the water gradually percolated away until it reached the level of the surrounding saturated area. There is no salt in the adjacent ground water, but the underlying Red Beds are intensely saline. This is shown by a test well sunk on the rim of the pit, in which impure rock salt was found at a depth of 325 feet.

One of the most curious phenomena in connection with this pool is the occasional high temperature at the bottom. The surrounding ground water remains constantly at 59° F. The surface water in the salt pit has a varying temperature, as might be expected, since it is exposed to the sun. On one occasion when the surface temperature stood at 89° F. the bottom temperature was found to be 156° F., the water being apparently stratified according to density. Thus a swimmer on the surface of the water enjoys a comfortable temperature, but on assuming an erect position his feet will be almost scalded. After several cloudy days the temperature at the bottom of the pool fell to 98° F. and at the surface to 76° F. The extraordinary range of heat at the bottom of this salt

pool led to the sinking of the test well, above noted, on its margin. In this the temperature of the rocks was found to be normal, the increase from surface to bottom being only about 11° F. in 325 feet.

FORESTRY.—The annual meeting of the American Forestry Association was held in Washington on December 14, 1898. Hon. James Wilson, Secretary of Agriculture, was elected President, and Dr. B. E. Fernow, of Cornell University, Vice-President. Mr. Gifford Pinchot, of New York, who recently succeeded Dr. Fernow as Chief of the Division of Forestry, was elected Chairman of the Board of Directors of the Association.

This meeting marks the end of the sixteenth year of active work and agitation on behalf of a rational and businesslike conservation of the forest resources of the country. It has been a year full of results, some of which, coming after many years of weary effort, have been a matter of surprise to the friends of the forestry movement. At the beginning of the year a determined attempt was made by Western politicians to throw open the reserves and to undo all that had been accomplished. When it was found that public sentiment was too strong to permit this and that some form of protection of the public forests was proposed, the opposition suddenly vanished and in its place came importunities for new reservations, or in other words new offices to be filled, the new places not being within the classified civil service. A year ago foresters feared that all reserves would be abolished; now they have reason to guard against the too hasty creation of new reservations.

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